

What is claimed is:

1. A retractable lens having an optical element retracting mechanism, said retractable lens including an optical system having a plurality of optical elements,
5 said retractable lens comprising:

a linearly movable ring configured to be guided along an optical axis of said photographing optical system without rotating, said linearly movable ring retracting toward a plane along said optical axis when said
10 retractable lens moves from an operational state to a fully-retracted state;

a retractable holder configured to support a retractable optical element as one of the plurality of optical elements, said retractable holder positioned
15 inside and supported by said linearly movable ring, such that said retractable holder is movable in a plane substantially orthogonal to said optical axis;

a holding device configured to hold said retractable holder such that said retractable optical element remains
20 on said optical axis when said retractable lens is in said operational state;

a retracting device configured to move said retractable holder such that said retractable optical element retracts to a radially retracted position which
25 deviates from said photographing optical axis when said

linearly movable ring, together with said retractable holder, retracts toward said picture plane; and

a flexible PWB configured to connect an electronic component supported inside said linearly movable ring, with an electronic circuit positioned outside said linearly movable ring;

wherein said retractable holder is separate from said flexible PWB when said retractable holder is held by said holding device in an operational position in which said retractable optical element is on said optical axis; and

wherein said retractable holder presses said flexible PWB in a radial direction of said linearly movable ring from an inside to an outside of said linearly movable ring and supports said flexible PWB when said retractable holder is moved to a radially retracted position by said retracting device such that said retractable optical element retracts to said position that deviates from said photographing optical axis.

2. The retractable lens according to claim 1, wherein said retractable holder comprises:

a cylindrical lens holder portion configured to hold said retractable optical element;

a swing arm portion projecting from said cylindrical lens holder in a radial direction of said cylindrical lens

holder portion; and

a pivoted cylindrical portion fixed to an end of said swing arm portion, and fitted on a pivot to be rotatable on said pivot, said pivot positioned inside said linearly
5 movable ring,

wherein said swing arm portion presses said flexible PWB when said rotatable holder is rotated to said radially retracted position by said retracting device.

3. The retractable lens according to claim 2,
10 wherein said pivot extends generally parallel to said optical axis.

4. The retractable lens according to claim 1, wherein said flexible PWB comprises:

a straight portion which extends parallel to said
15 optical axis from said electronic component along an inner peripheral surface of said linearly movable ring; and

a loop-shaped turning portion which bends radially outwards proximate a rear end of said linearly movable ring,

20 wherein said rotatable holder comes into contact with said loop-shaped turning portion when said rotatable holder is rotated to said radially retracted position by said retracting device.

5. The retractable lens according to claim 4,
25 wherein said linearly movable ring comprises a linear

guide groove which extends substantially parallel to said optical axis and penetrates said linearly movable ring in a radial direction thereof;

wherein said retractable photographing lens
5 further comprises a linear guide configured to guide said linearly movable ring linearly along said optical axis without rotating said linearly movable ring, said linear guide having a linear guide key configured to engage said linear guide groove to be guided therealong such that said
10 linearly movable ring is guided linearly along said optical axis by engagement of said linear guide key with said linear guide groove;

wherein said flexible PWB further comprises:

a second straight portion extending forward from
15 said loop-shaped turning portion along an inner surface of said linear guide key; and

a third straight portion extending rearward along an outer surface of said linear guide key from a front end of said second straight portion which is bent radially
20 outwards proximate a front end of said linear guide key; and

wherein said third straight portion is partially fixed to said linear guide key such that a size of said loop-shaped turning portion is variable in accordance
25 with relative movement between said linearly movable ring

and said linear guide in said optical axis direction.

6. The retractable lens according to claim 1,
wherein said retractable holder comprises:

a cylindrical lens holder portion configured to
5 hold said retractable optical element;

a swing arm portion projecting from said cylindrical
lens holder in a radial direction of said cylindrical lens
holder portion; and

a pivoted cylindrical portion fixed to an end of said
10 swing arm portion, and fitted on a pivot to be rotatable
on said pivot, said pivot positioned inside said linearly
movable ring,

wherein said flexible PWB comprises:

a straight portion which extends parallel to said
15 optical axis from said electronic component along an inner
peripheral surface of said linearly movable ring; and

a loop-shaped turning portion which bends radially
outwards proximate a rear end of said linearly movable
ring,

20 wherein said swing arm portion comprises a
projection that projects rearward and comes into contact
with said loop-shaped turning portion to support said
loop-shaped turning portion when said rotatable holder
is rotated to said radially retracted position by said
25 retracting device.

7. The retractable lens according to claim 1,
wherein said electronic component comprises a shutter
unit.

8. The retractable lens according to claim 1,
5 wherein said plurality of optical elements comprises at
least one rear optical element positioned behind said
retractable optical element when said retractable
photographing lens is in said ready-to-photograph state;
and

10 wherein said retractable optical element is
positioned in an off-axis space radially outside an
on-axis space in which said rear optical element is
positioned, so that said retractable optical element and
said rear optical element are in substantially a same
15 positional range in the optical axis direction, when said
retractable photographing lens is in said fully-
retracted state.

9. The retractable lens according to claim 1,
wherein said retractable optical element comprises a lens
20 group.

10. The retractable lens according to claim 1,
wherein said optical system comprises a zoom
photographing optical system; and

wherein said retractable optical element comprises
25 a lens group as a part of said zoom photographing optical

system.

11. The retractable lens according to claim 1,
wherein said holding device comprises a spring configured
to bias said retractable holder to move in a direction
5 to position said retractable optical element on said
optical axis.

12. The retractable lens according to claim 1,
wherein said photographing lens is incorporated in a
digital camera, said retractable photographing lens
10 being retracted into a camera body when in said fully
retracted state.

13. The retractable lens according to claim 12,
wherein said electronic circuit comprises a CPU
configured to control operation of said digital camera.